

Using Biofuel Tax Credits to Achieve Energy and Environmental Policy Goals

Proponents of federal support for biofuels, which are transportation fuels produced mainly from renewable plant matter, offer several rationales for that support. First, biofuels may help the nation meet energy policy goals by increasing the domestic production of fuels for transportation and reducing the United States' dependence on fossil fuels, such as oil. Second, biofuels may contribute to meeting environmental policy objectives, such as the reduction of greenhouse gas emissions. Third, federal support for biofuels can increase incomes in the agricultural sector.

The federal government began providing tax credits for various biofuels in the 1970s; in addition, laws enacted in recent years have required producers or blenders of transportation fuels to incorporate specified minimum annual amounts of biofuels—amounts that rise over time—into the fuels that they sell. Different types of biofuels have been granted different tax credits, ranging from 45 cents per gallon to approximately one dollar per gallon. Those differing credits raise questions about whether federal policy provides equal incentives for producing different kinds of biofuels and imposes equal costs on taxpayers for achieving certain energy or environmental policy goals.

Roughly 11 billion gallons of biofuels were produced and sold in the United States in 2009, and ethanol produced from corn accounted for nearly all (about 10.8 billion gallons) of that total. Blenders of transportation fuels receive a tax credit of 45 cents for each gallon of ethanol (regardless of the feedstock, or raw material) that is combined with gasoline and sold. Although the credit is provided to blenders, most of it ultimately flows to producers of ethanol and to the farmers who grow the corn—in the form of higher prices received for their products.

Most of the rest of the biofuel sold in the United States consists of biodiesel, which is made largely from soybean oil but is also produced from animal fats, recycled plant oils, and other feedstocks. Until recently, the producers of biodiesel made from new oils or animal fats received a tax credit of one dollar per gallon. Although that credit expired in December 2009, the Congressional Budget Office (CBO) included it in the analysis to provide information about the value of the credit should policymakers, as they have at other times, decide to reinstate it.

In the future, cellulosic ethanol could account for a significant share of domestic production of biofuels. Cellulosic ethanol is made from plant wastes, such as corn stover (basically the leaves and stalks of corn plants) or woodchips, or from crops grown specifically for fuel production, such as switchgrass (a tall North American grass used for hay and forage). Its producers are eligible for a tax credit of \$1.01 per gallon if it is produced and blended with gasoline; even with that credit, however, cellulosic ethanol is not viable commercially today and is produced in very limited quantities.

In fiscal year 2009, the biofuel tax credits reduced federal excise tax collections by about \$6 billion below what they would have been if the credits had not been in effect. This CBO study assesses the credits' contributions to achieving energy and environmental goals in the light of those forgone revenues; it does not consider any impact on farm incomes or the agricultural sector more broadly. The analysis focuses specifically on the differential effects of the various credits in achieving two objectives: displacing the use of petroleum fuel and reducing greenhouse gas emissions.

CBO's main conclusions are the following:

- The incentives that the tax credits provide to producers of biofuels differ among the fuels. After adjustments for the different energy contents of the various biofuels and the petroleum fuel used to produce them, producers of ethanol made from corn receive 73 cents to provide an amount of biofuel with the energy equivalent to that in one gallon of gasoline. On a similar basis, producers of cellulosic ethanol receive \$1.62, and producers of biodiesel receive \$1.08.
- The costs to taxpayers of reducing consumption of petroleum fuels differ by biofuel. Such costs depend on the size of the tax credit for each fuel, the changes in federal revenues that result from the difference in the excise taxes collected on sales of gasoline and biofuels, and the amount of biofuels that would have been produced if the credits had not been available. The costs to taxpayers of using a biofuel to reduce gasoline consumption by one gallon are \$1.78 for ethanol made from corn and \$3.00 for cellulosic ethanol. The cost of reducing an equivalent amount of diesel fuel (that is, a quantity having the same amount of energy as a gallon of gasoline) using biodiesel is \$2.55, based on the tax policy in place through last year.
- Similarly, the costs to taxpayers of reducing greenhouse gas emissions through the biofuel tax credits vary by fuel: about \$750 per metric ton of CO₂e (that is, per metric ton of greenhouse gases measured in terms of an equivalent amount of carbon dioxide) for ethanol, about \$275 per metric ton of CO₂e for cellu-

losic ethanol, and about \$300 per metric ton of CO₂e for biodiesel. Those estimates do not reflect any emissions of carbon dioxide that occur when the production of biofuels causes forests or grasslands to be converted to farmland for growing the fuels' feedstocks. If those emissions were taken into account, such changes in land use would raise the cost of reducing emissions and change the relative costs of reducing emissions through the use of different biofuels—in some cases, by a substantial amount.

Federal biofuel mandates require vendors of motor fuels to produce or blend specified minimum volumes of the different fuels with gasoline and diesel fuel; the annual targets are scheduled to rise through 2022. In the past, those requirements have not directly increased the quantity of biofuels sold in the United States because the combination of underlying economic conditions and the biofuel tax credits has caused the use of biofuels to exceed the mandated quantities. However, the mandates probably provided producers with some degree of confidence that a market for those fuels would exist, thereby encouraging investment in the facilities needed to produce them. In the future, the scheduled rise in mandated volumes would require the production of biofuels in amounts that are probably beyond what the market would produce even if the effects of the tax credits were included. To the extent that the mandates determine levels of production in the future, the biofuel tax credits would no longer be increasing production, but they would still be reducing the costs borne by producers and consumers of biofuels and shifting some of those costs to taxpayers.